

What is claimed is:

1. A method of sensing the temperature of a molten metal vehicle,
comprising:
dispensing molten metal from the molten metal vehicle;
5 capturing at least one thermal image of the molten metal vehicle;
identifying an area of the dispensing molten metal from the thermal image;
and
determining the rotational position of the molten metal vehicle based on the
identified area.
- 10 2. The method of claim 1, further including capturing the thermal image
from a side opposite the dispensing side of the molten metal vehicle.
3. The method of claim 1, wherein the maximum area of molten metal is
obtained when the molten metal vehicle is rotated at least 90°.
- 15 4. The method of claim 1, further including determining whether the
molten metal vehicle has come to a stop.
5. The method of claim 1, further including correcting a distortion in the
image obtained from the thermal imager.
6. The method of claim 5, wherein the distortion is corrected using one of
an algorithm and a look-up table.
- 20 7. The method of claim 1, further including establishing a frame of
reference for the thermal imager.
8. The method of claim 7, wherein the frame of reference is established
by obtaining a border between the molten metal vehicle and the ambient
surroundings.
- 25 9. The method of claim 1, further including identifying the molten metal
vehicle.

10. The method of claim 9, wherein the identifying the molten metal vehicle includes one of recognizing an identifying mark on the molten metal vehicle with the thermal imager and recognizing a thermal fingerprint of the molten metal vehicle with the thermal imager.

5 11. The method of claim 1, further including determining physical characteristics of the molten metal vehicle from the captured thermal image.

12. The method of claim 11, wherein the physical characteristic includes one of a thin spot on the molten metal vehicle and a lack of a thin spot on the molten metal vehicle.

10 13. The method of claim 1, further including activating an alarm.

14. A method of sensing the temperature of a molten metal vehicle, comprising:

capturing at least one thermal image of the molten metal vehicle using at least one thermal imager having a lens;

15 realizing a plurality of pixels from the thermal image;

replacing distorted pixels from the captured image with non-distorted pixels from a look-up table; and

obtaining a thermal image representative of the molten metal vehicle.

20 15. The method of claim 14, further including choosing a look-up table based on the lens of the thermal imager.

16. The method of claim 14, further including choosing a look-up table based on the resolution of the thermal image.

17. A method of sensing the temperature of a molten metal vehicle, comprising:

obtaining past temperature data relating to the molten metal vehicle;

capturing a thermal image of the molten metal vehicle;

5 obtaining a reference temperature of the molten metal vehicle; and

calculating a normalized hotspot temperature.

18. The method of claim 17, wherein the past temperature data includes one of a past hot spot temperature and a past reference temperature.

10 19. The method of claim 17, further including obtaining a hot spot temperature of the molten metal vehicle.

20. The method of claim 19, wherein calculating a normalized hotspot temperature further includes comparing the hot spot temperature to the past temperature data.

15 21. The method of claim 17, wherein calculating a normalized hotspot temperature further includes comparing the reference temperature to the past temperature data.

22. The method of claim 17, wherein the reference temperature is obtained from a portion of the molten metal vehicle less affected by the molten metal than a portion of the molten metal vehicle that is in contact with the molten metal.

20 23. A system for sensing a temperature of a molten metal vehicle, comprising:

at least one thermal imager; and

25 a controller communicably coupled to the thermal imager, wherein the controller is adapted to receive thermal image data from the thermal imager, identify an area of dispensing molten metal from the thermal image, and determine the rotational position of the molten metal vehicle based on the identified area.

24. The system of claim 23, wherein the thermal imager is located on a side of the molten metal vehicle opposite the dispensing side of the molten metal vehicle.

5 25. The system of claim 23, wherein the controller is programmed to identify a maximum area of molten metal.

26. The system of claim 23, further including a molten metal vehicle sensor communicatively coupled to the controller, wherein the sensor is activated by the molten metal vehicle.

10 27. The system of claim 23, wherein the controller is programmed to correct a distortion in the thermal image.

28. The system of claim 27, wherein the controller corrects the thermal image using one of an algorithm and a look-up table.

15 29. The system of claim 23, wherein the controller is programmed to establish a frame of reference for the thermal imager relative to the molten metal vehicle.

30. The system of claim 29, wherein the controller and memory establish a frame of reference by obtaining a border between the molten metal vehicle and the ambient surroundings from the thermal image.

20 31. The system of claim 23, wherein the controller is programmed to identify the molten metal vehicle by recognizing a thermal fingerprint of the molten metal vehicle from the thermal image.

32. The system of claim 23, wherein the controller is programmed to identify the molten metal vehicle by recognizing an identifying mark on the molten metal vehicle from thermal image.

25 33. The system of claim 23, wherein the controller is programmed to determine a physical characteristics of the molten metal vehicle from the thermal image.

34. The system of claim 33, wherein the physical characteristic includes one of a thin spot on the molten metal vehicle and a lack of a thin spot on the molten metal vehicle.

5 35. The system of claim 23, further including an alarm communicatively coupled to the controller.

36. The system of claim 35, wherein the controller is programmed to activate the alarm in response to determining that the molten metal vehicle has a thin spot.

10 37. A system for sensing a temperature of a molten metal vehicle, comprising:

at least one thermal imager having a lens; and

15 a controller communicably coupled to the thermal imager, the controller being adapted to receive thermal image data from the thermal imager, realize a plurality of pixels from the thermal image, and replace distorted pixels with non-distorted pixels from a look-up table.

38. The system of claim 37, wherein the look-up table corresponds to the lens of the thermal imager.

39. The system of claim 37, wherein the look-up table corresponds to the resolution of the thermal imager.

40. A system for sensing the temperature of a molten metal vehicle,
comprising:

at least one thermal imager;

5 a controller is communicably coupled to the thermal imager and memory, the
controller being adapted to receive thermal image data from the thermal imager, a
memory storing past molten metal vehicle temperature data, obtain current
temperature data from the thermal image, and calculate a normalized hotspot
temperature from the current temperature data, and the past temperature data.

10 41. The system of claim 40, wherein the past temperature data includes
one of a past hot spot temperature and a past reference temperature.

42. The system of claim 40, wherein the current temperature data includes
one of a hot spot temperature and a reference temperature

15 43. The system of claim 42, wherein the controller is programmed to
obtain the normalized hotspot temperature by comparing the hot spot temperature and
the reference temperature to the past temperature data.

44. The system of claim 41, wherein the controller is programmed to
obtain the normalized hotspot temperature by comparing the past hot spot temperature
and the past reference temperature to the current temperature data.

20 45. The system of claim 41, wherein the reference temperature is obtained
from a portion of the molten metal vehicle less affected by the molten metal than a
portion of the molten metal vehicle that is in contact with the molten metal.

46. The system of claim 42, wherein the reference temperature is obtained
from a portion of the molten metal vehicle less affected by the molten metal than a
portion of the molten metal vehicle that is in contact with the molten metal.